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(54) **REAL-TIME DATA MANAGEMENT FOR A NETWORK COMPRISING A HETEROGENEOUS SET OF TERMINALS, SERVER AND MAIN TERMINAL FOR SUCH A SYSTEM**

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(57)   **ABSTRACT**

The invention concerns a data management system, for a local data transmission network (**10**) comprising terminals (**8, 12, 14, 16, 18**) with different data processing capabilities, including: first means (**38**) for determining the local network (**10**) terminal composition and their data processing capability; means (**24**) for analysing data transmitted to said local network; second means (**26**) for determining terminal(s) most suited for processing said data, based on the data processing capability of each of them; and means (**28**) for routing said data to the terminal(s) most suited as previously determined.
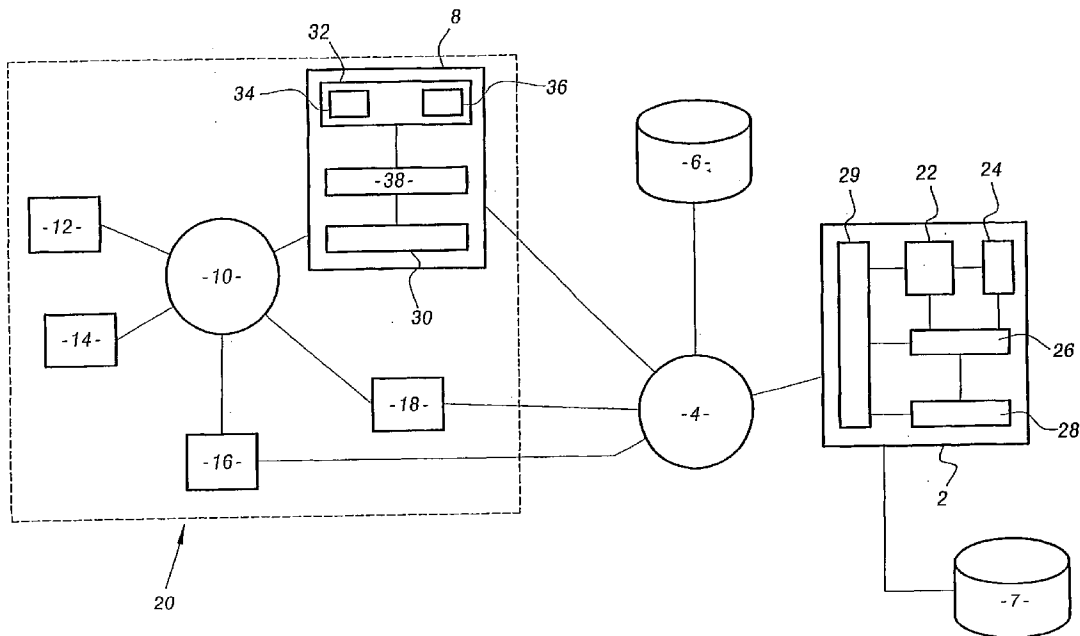
FIG.1
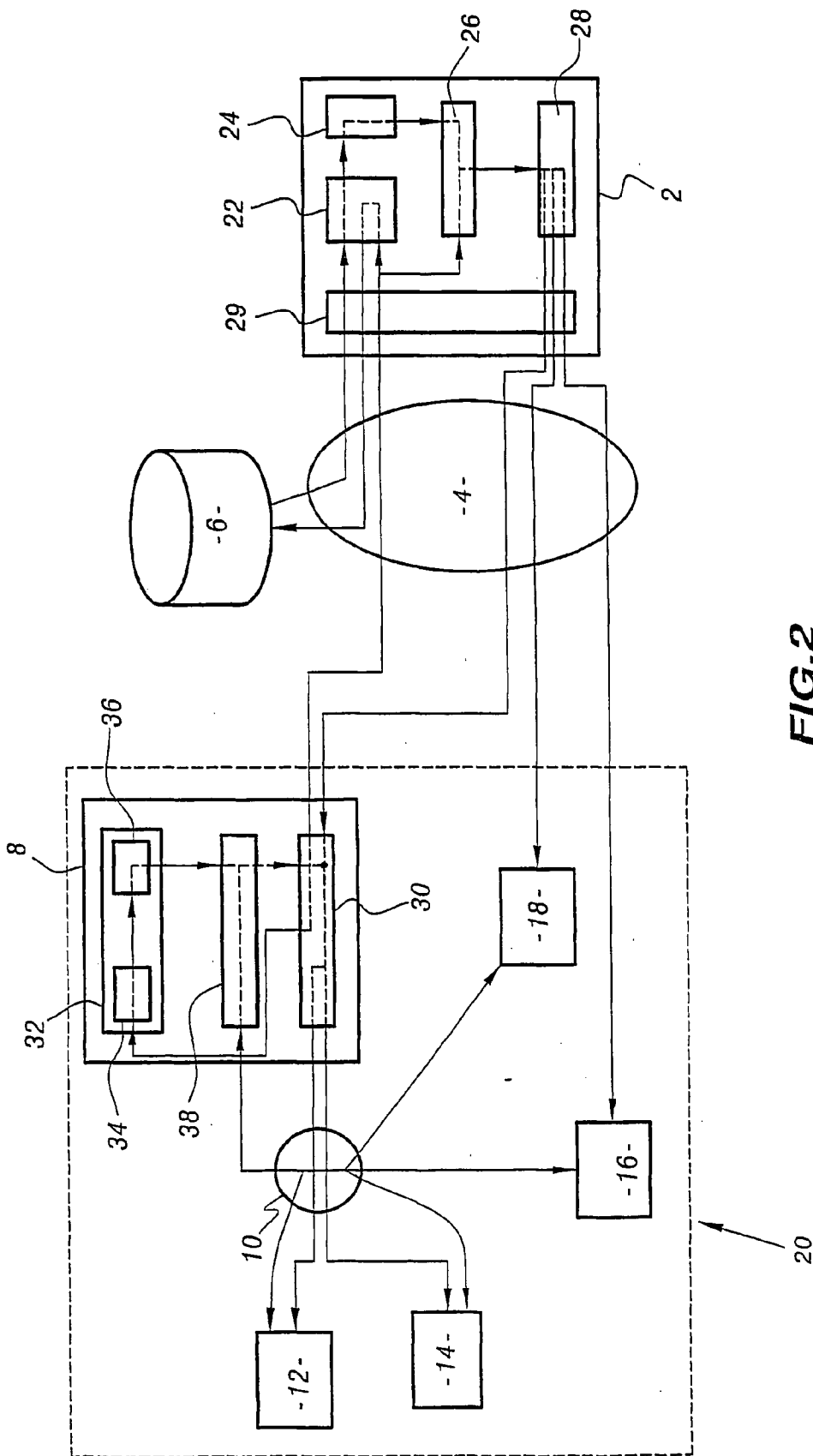
FIG.2

FIG.3
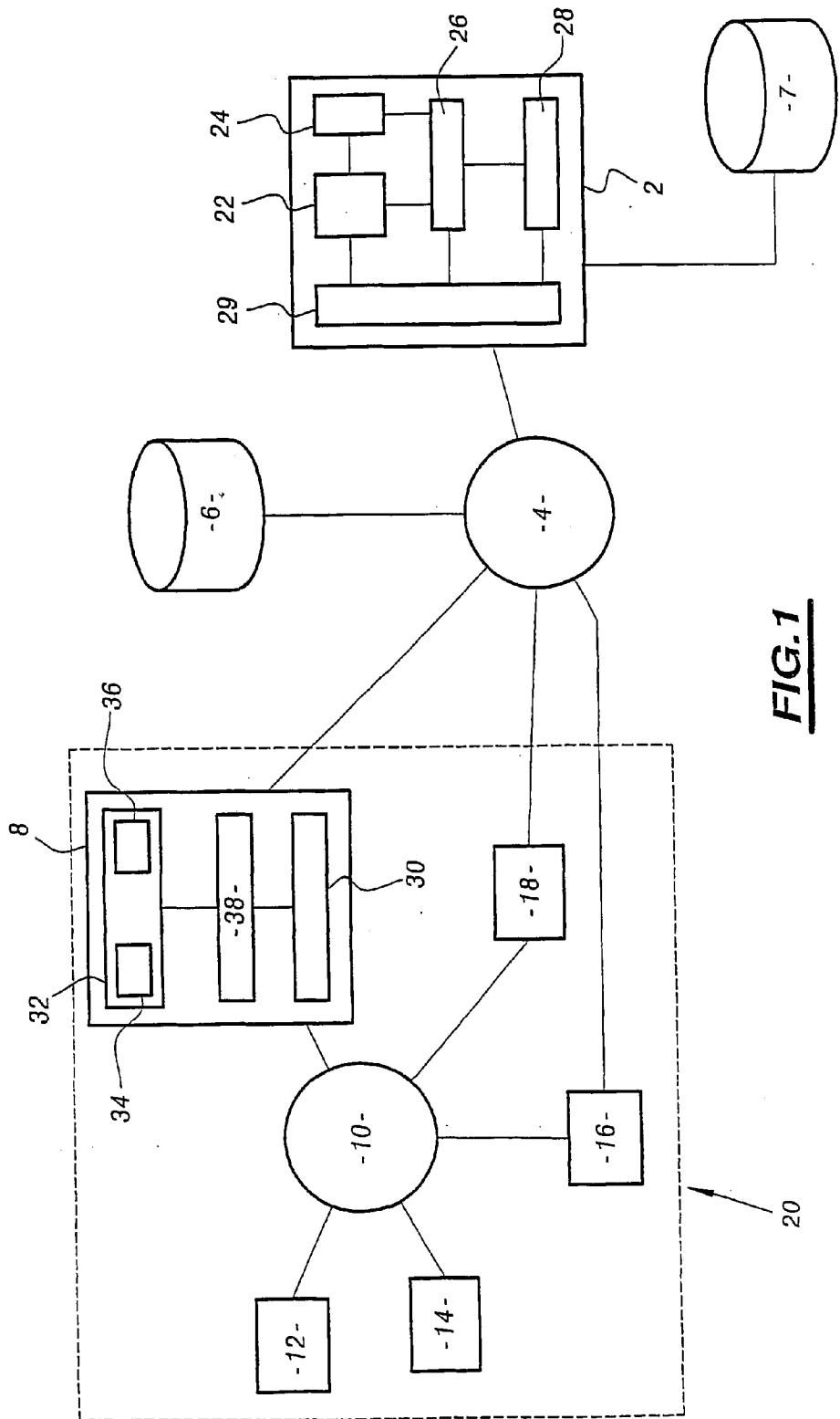
FIG.4

REAL-TIME DATA MANAGEMENT FOR A NETWORK COMPRISING A HETEROGENEOUS SET OF TERMINALS, SERVER AND MAIN TERMINAL FOR SUCH A SYSTEM

[0001] The present invention relates to a data management system, a service and a main terminal for such a system.

[0002] More precisely, the invention relates to a data management system for a local data transmission network comprising terminals having different data processing capacities.
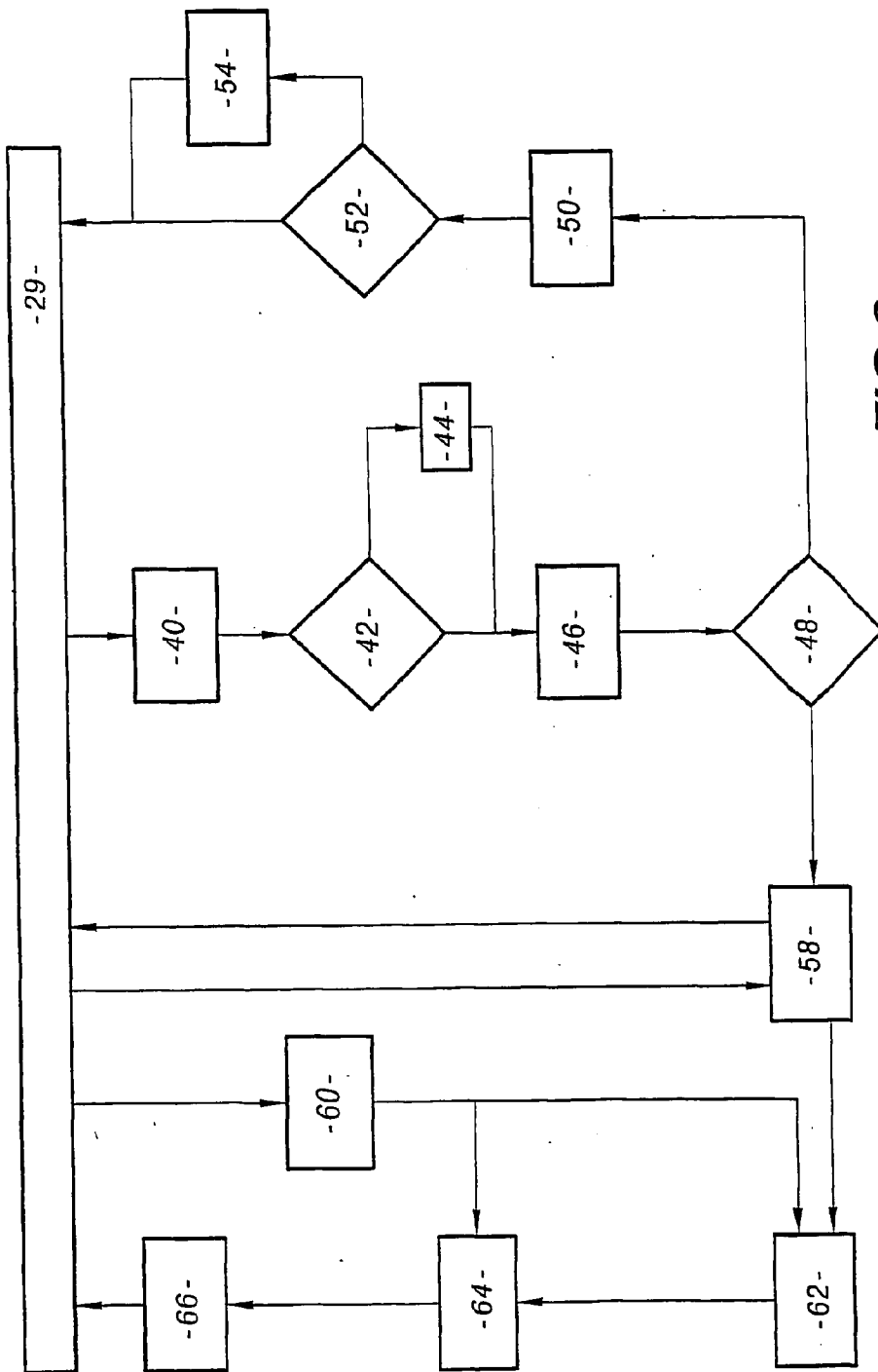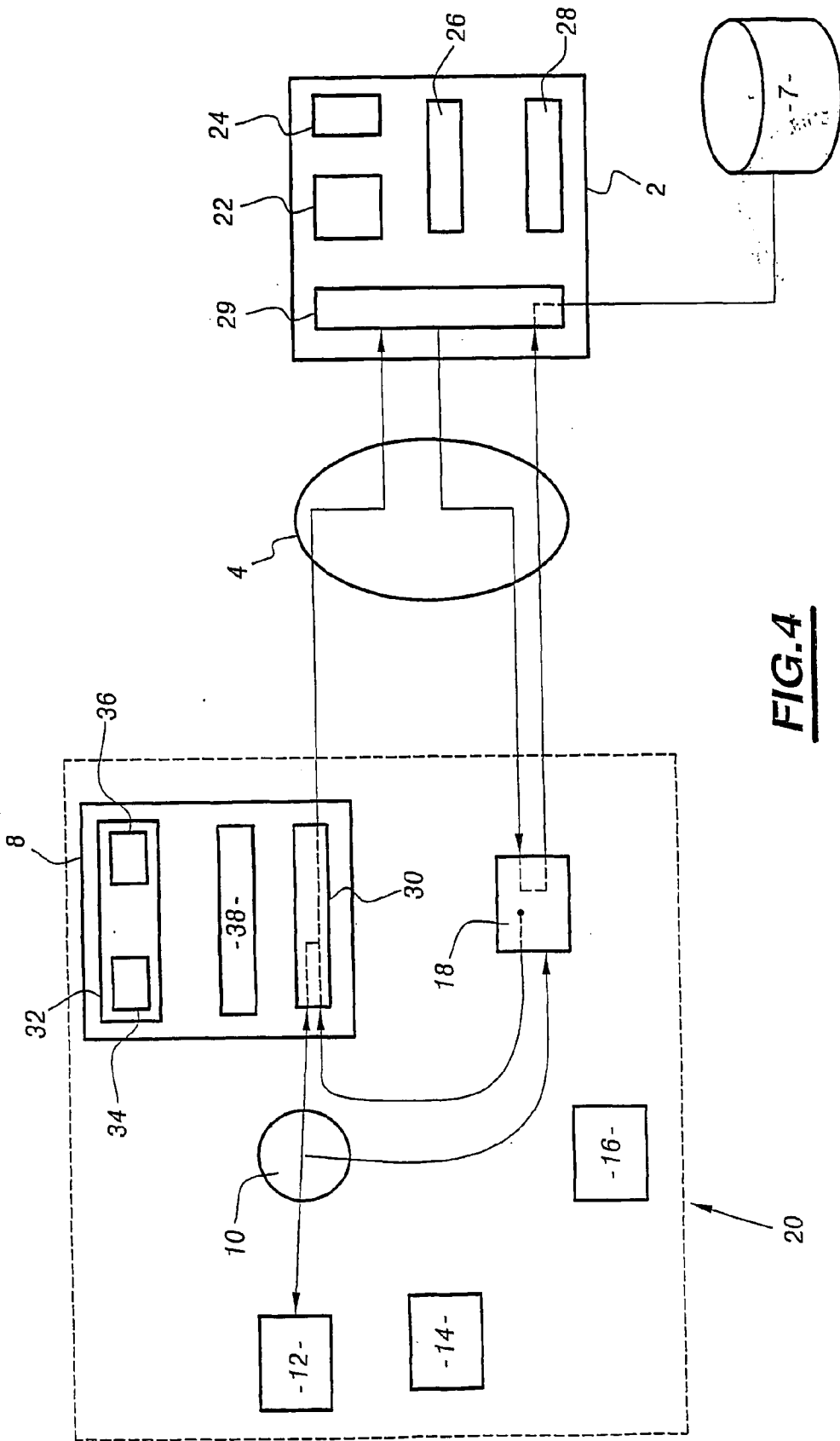
[0003] A data management system of this type generally applies to data circulating between the terminals of the local network, but also to data received by the local network and destined for at least one terminal of this network and to data transmitted by at least one of the terminals of the network destined for example for a server or for an external network.

[0004] In particular, when a local network terminal transmits a request for data to a server which includes a multimedia data search engine in its databases which are accessible by the Internet, it receives from the server in return data corresponding to its request and for example taking the form of a multiplicity of data files of different formats and sizes.

[0005] During these operations the data management system of the local network undertakes the transmission of the request for data destined for the server and the transmission of the files returned to the terminal.

[0006] When this system is applied to a local network comprising different terminals, certain of which have limited data processing capacity whilst being adapted to transmit requests for data, particularly mobile terminals, these are not necessarily capable of processing the files which are returned in response to a request which they have transmitted.

[0007] It will be noted that processing of the files is understood to mean in particular the presentation to a user of the data which they contain.

[0008] The invention seeks to remedy these drawbacks of a conventional data management system of this type by creating a data management system capable of managing the data transmitted or received by the local network, taking account at best of the different processing capacities of the terminals of this network.

[0009] The invention therefore relates to a data management system for a local data transmission network comprising terminals having different data processing capacities, characterised in that it comprises:

[0010] first means for determination of the composition of the local network in terms of terminals and the data processing capacity of the terminals;

[0011] means for analysis of the transmitted data destined for this local network;

[0012] second means for determination of the most appropriate terminal or terminals for the processing of these data as a function of the data processing capacity of each of them;

[0013] means for routing of these data to the most appropriate terminal or terminals as determined previously.

[0014] Thus the data management system according to the invention enables, after analysis of the transmitted data destined for the local network, these data to be directed to the terminal or terminals most appropriate to the processing thereof, by virtue of the knowledge which it has of the composition of the local network in terms of terminals and the respective data processing capacity of the terminals.

[0015] The data management system according to the invention may also comprise one or more the following characteristics:

[0016] the transmitted data destined for the local network comprise several data portions of specific sizes and formats for each of them, and the second means for determination are means for determination, for each of these data portions, of the most appropriate terminal for the processing of this data portion as a function of the data processing capacity of each of the terminals;

[0017] the means for analysis of the transmitted data destined for the local network are means for analysis of formats and of sizes associated with these data;

[0018] the terminals are of different kinds;

[0019] the local data transmission network comprises a predetermined main terminal connected to an external data transmission network;

[0020] it comprises means for transmission of data originating from some of the terminals of the local network to storage means which are accessible by the external network;

[0021] the first means for determination are associated with means for automatic constitution of the local network comprising means for detection of terminals within a predetermined vicinity of the main terminal, and means for connection of these terminals and of the main terminal to one another;

[0022] the means for automatic constitution of the local network comprise means for activation of the first means for determination, from the time of the appearance of a change in the composition of this local network;

[0023] the main terminal is a mobile terminal;

[0024] the main terminal comprises means for automatic constitution of the local network and means for transmission of the composition of the local network in terms of terminals to the second means for determination of the most appropriate terminal or terminals; and

[0025] it further comprises a server, connected to the external network, comprising means for analysis, the second means for determination of the most appropriate terminal or terminals, the means for routing and means for data searching on the Web as a function of a request transmitted by the main terminal.

[0026] The invention also relates to:

[0027] a server for a data management system as described previously; and

[0028] a main terminal for a data management system as described previously.

[0029] The invention will be better understood on reading the following description which is given solely by way of example and with reference to the accompanying drawings, in which:

[0030] FIG. 1 is a schematic view of the general structure of a data management system according to a particular embodiment of the invention;

[0031] FIG. 2 is a schematic view showing the exchanges of data between the elements which constitute the data management system shown in FIG. 1, at the time of processing of a request for data transmitted by a terminal of the system;

[0032] FIG. 3 shows, in the form of a flow chart, a method of management of a request for data by a server, employed in a data management system according to the invention; and

[0033] FIG. 4 is a schematic view showing the exchanges of data between the elements which constitute the data management system shown in FIG. 1, during the transmission of data transmitted by some of the terminals of the system.

[0034] The data management system shown in FIG. 1 has a server 2 connected to an external data transmission network 4.

[0035] In this example the external network 4 is, in a conventional manner, an assembly of interconnected heterogeneous networks, including inter alia the Internet, a switched telephone network and a network of the UMTS type. The connection of the server 2 to the network 4 is established in a conventional manner by means of a modem (not shown) which is itself connected to a link for access to the network 4.

[0036] Thus the server 2 has access to data stored in storage means 6, constituted here by the World Wide Web, usually called the Web.

[0037] The server 2 is also connected locally to storage means 7, comprising for example a database of the conventional type.

[0038] The server 2 is also accessible by a mobile terminal, likewise connected to the network 4. In this example the mobile terminal 8 is a third-generation mobile telephone supporting the conventional UMTS communication standard which enables it to exchange data with the server 2.

[0039] This mobile telephone 8 is also connected to other terminals situated in its vicinity by means of a local data transmission network 10. These other terminals are for example a microcomputer 12, loudspeakers 14, a fax machine 16 and a digital personal organiser 18. The local network 10 for its part is preferably a network for Hertzian transmission of communications.

[0040] These terminals 8, 12, 14, 16 and 18 are equipped with means for communication with each other via the local network 10, supporting the conventional Bluetooth technology. Thus they form an assembly 20 of terminals capable of exchanging data with each other by the Hertzian route, conventionally called the pico-net.

[0041] Amongst the pico-net terminals, apart from the mobile telephone 8, the fax machine 16 is connected to the data transmission network 4 by means of a conventional telephone line, and the personal organiser 18 is likewise connected to the data transmission network 4 by means of a wireless data transmission channel supporting the conventional WAP communication protocol.

[0042] The server 2 has an input/output interface 29 of the conventional type adapted for the exchange of data with the data transmission network 4, destined for or originating from one of the terminals 8, 12, 14, 16 and 18 and the Web 6.

[0043] This server 2 also has a search engine 22 connected to the input/output interface 29 by a data transmission bus of the conventional type. This search engine 22 may have any suitable conventional structure whatsoever, for example based on a computer, to receive data requests from the mobile telephone 8, to analyse these requests and to receive data originating from the Web 6 as a function of the said requests.

[0044] For example, the search engine 22 includes a voice synthesiser to transform data of the textual type into audio data, and a voice dictation system to transform audio data into data of the textual type.

[0045] The server 2 also has means 24 for analysis of the received data originating from the Web 6 in response to a request transmitted by the mobile telephone 8 and transmitted to the search engine 22.

[0046] The means for analysis 24 are adapted to process the data originating from the Web 6 in order to determine the size in bytes and the format of each of these data.

[0047] The means for analysis 24 may generally include for example computer systems programmed in order to carry out this function.

[0048] The server 2 also has means for adaptation 26 of the data originating from Web 6 to the structure of the pico-net 20. The means for adaptation 26 are connected to the input/output interface 9, to the search engine 22 and to the means for analysis 24 by a data transmission bus.

[0049] They are adapted for the determination of the terminal or terminals of the pico-net 20 most appropriate for the processing of the data originating from the Web 6.

[0050] They also have conventional means for conversion of format (not shown), in order to convert data originating from the Web 6 and analyses by the means for analysis 24. The functioning of these means will be detailed below.

[0051] Finally, the server 2 includes routing means 28 in order to direct each of the data originating from the Web 6 and responding to a request transmitted by the mobile telephone 8 to the terminal or terminals of the pico-net 20 determined by the means for adaptation 26 as being the most appropriate for processing these data.

[0052] In order to carry out this operation, the routing means are themselves also connected to the input/output interface 29 of the server 2.

[0053] The mobile telephone 8 for its part has an input/output interface 30 for the exchange of data with the server 2 via the data transmission network 4 and for the exchange

of data with the other terminals **12**, **14**, **16** and **18** of the pico-net **20** via the local network **10**.

[0054] The mobile telephone **8** also has means **32** for automatic constitution of the local network **10**.

[0055] These means **32** for automatic constitution include in a conventional manner means **34** for detection of terminals within a predetermined vicinity of the mobile telephone **8**, and means **36** for automatic connection of these terminals, that is to say in this example the microcomputer **12**, the loudspeakers **14**, the fax machine **16** and the digital personal organiser **18**, to the mobile telephone **8**. This latter then forms the main terminal of the pico-net **20** thus constituted. The means **34** for detection of terminals are adapted to supply to the connection means **36** all of the terminals situated in the vicinity of the mobile telephone **8** in response to a request from this latter. Finally, the mobile telephone **8** has means **38** for determination of the composition of the pico-net **20** in respect of terminals **8**, **12**, **14**, **16** and **18** and of the respective data processing capacities of these terminals.

[0056] The means **32** for automatic constitution of the local network **10** and the means **38** for determination of the composition of the pico-net **20** in terms of terminals may generally include computer systems programmed to carry out these functions.

[0057] Such computer systems are already known in the prior art, so that they will not be described in detail.

[0058] A description will now be given with reference to **FIG. 2** of the exchanges of data effected between the terminals of the pico-net **20** and the server **2** in the case of a data request transmitted by the mobile telephone **8**.

[0059] A data request transmitted by the mobile telephone **8** is input into the latter by a user, for example manually or orally.

[0060] When this request is recorded by the interface **30** of the mobile telephone **8**, this latter transmits a preliminary request for data concerning the constitution of the pico-net **20** to the detection means **34**. In response, these latter transmit to the connection means **36** data concerning all of the terminals **12**, **14**, **16**, **18** situated in the vicinity of the mobile telephone **8**.

[0061] The connection means **36**, after having established or verified the connection of these terminals to the mobile telephone **8**, activate the determination means **38**.

[0062] These latter then collect data concerning data processing capacity for each of the terminals **8**, **12**, **14**, **16**, **18** of the local network **10** and transmit these data to the interface **30** of the mobile telephone **8**.

[0063] The mobile telephone **8** then transmits to the server **2** the data request recorded by the interface **30** and associated with the data concerning the composition of the local network **10** in terms of terminals and the data processing capacity of the terminals.

[0064] These data are transmitted by the input/output interface **29** of the server **2** on the one hand to the search engine **22** in relation to the data request and on the other hand to the adaptation means **26** in relation to the data concerning the composition of the local network **10** in terms of terminals and the data processing capacity of the termi-

nals. The search engine **22** then interrogates the Web **6** as a function of the data request transmitted by the mobile telephone **8**.

[0065] Data originating from the Web **6** are recovered by the search engine **22**, then supplied to the analysis means **24**.

[0066] These analysis means **24**, after treatment of the data received in response to the data request, supply data relating to the format and the size of the each of these data to the adaptation means **26**.

[0067] The adaptation means **26** then transmit to the routing means **28** the received data originating from the Web **6**, associating each of them with instructions for routing to a terminal of the pico-net **20** selected as being the most appropriate for processing it.

[0068] As a function of these instructions, the routing means **28** transmit each item of data supplied in response to the data request transmitted by the mobile telephone **8** to the terminal of the pico-net **20** selected for processing this item of data.

[0069] The routing means **28** directly transmit each item of data to the terminal concerned, if this is the fax machine **16** or the personal organiser **18** or the mobile telephone **8**, all three of which are connected to the network **4**.

[0070] On the other hand, if the terminal selected for processing this item of data is the microcomputer **12** or the loudspeaker **14**, which are not connected directly to the network **4**, the routing means **28** transmit this item of data to the interface **30** of the mobile telephone **8**, which serves to transmit this data to the terminal concerned via the local network **10**.

[0071] A detailed description will now be given of the operation of the server **2** in the case of management of a data request, with reference to **FIG. 3**.

[0072] When the input/output interface **29** of the server **2** receives a data request originating from the mobile telephone **8**, during a first step **40**, it transmits it to the search engine **22**.

[0073] In a following step **42**, the search engine **22** determines the format of this request.

[0074] If it is a request input orally by the user of the mobile telephone **8**, the system passes to a step **44** of transformation of this oral request into a textual request, followed by a step **46** of analysis of the request.

[0075] On the other hand, if the request has been input manually by the user in textual form, the system passes directly to step **46** of analysis of the request.

[0076] Then in a test step **48**, the search engine **22** determines whether the request is sufficiently clear and precise.

[0077] If this is the case, the system passes to a step **58** of interrogation of the Web **6**, if not it proceeds to a step **50** of demand for precision.

[0078] When this demand for precision is formulated, the system proceeds to a step **52** of determination of the mode most adapted to the demand for precision. If during this step the vocal mode is chosen by the search engine **22**, the system

proceeds to a step **54** of transformation of the demand for precision, initially textual, into a vocal demand for precision.

[0079] Following steps **52** and **54**, the demand for precision is sent to the mobile telephone **8** and thus to the user.

[0080] The response to this demand for precision is then processed by the search engine **22** as the initial data request, at step **40**.

[0081] In the step **58** of interrogation of the Web **6**, the search engine **22** interrogates the Web **6** as a function of the data request and receives, originating from the Web **6**, multimedia data corresponding to this request.

[0082] In this same step **58**, the search engine **22** transmits the data received to the analysis means **24**, which determine the format and the size of the data.

[0083] In a step **60**, the input/output interface **29** of the server **2** transmits to the adaptation means **26** the data relating to the configuration of the pico-net **20**.

[0084] Following steps **58** and **60**, in a step **62** of conversion the adaptation means **26** convert some of the data originating from the Web **6** and received in step **58** as a function of the processing capacities of the different terminals **8**, **12**, **14**, **16** and **18**, as appropriate.

[0085] In fact, during this step the adaptation means **26** verify that, for each item of data received, its format and/or its size is/are adapted to the processing capacities of at least one of the terminals **8**, **12**, **14**, **16** and **18**. If this is not the case, they convert the format and/or the size of this item of data in accordance with a format and/or a size which can be processed by one of the said terminals.

[0086] Then in a step **64** of selection the adaptation means **26** select, for each item of data received from the Web **6** and converted if need be, the terminal of the pico-net **20** most adapted for processing it.

[0087] The selection is made, for example, in a conventional manner by means of cross-reference table including the processing capacities of each of the terminals of the pico-net **20**, which is accessible and updated by the adaptation means **26** during step **60**.

[0088] Finally, during a step **66** of transmission, the routing means **28** transmit each of the data originating from the Web **6** to each of the selected terminals of the pico-net **20**, either directly or indirectly, as described previously.

[0089] A description will now be given with reference to **FIG. 4** of the exchanges of data effected between the pico-net **20** and the server **2**, in the case of transmission of data transmitted by some of the terminals **8**, **12**, **14**, **16**, **18** in the direction of the server **2**.

[0090] A data transmission order is for example input manually by a user in the digital personal organiser **18**. This transmission order contains the identification data for the data to be transmitted and the identification data for the terminal or terminals of the local network **10** transmitting these data.

[0091] For example, these data are data stored in the microcomputer **12** and in the digital personal organiser **18**. In this case the transmission/reception means **30** of the mobile telephone **8** collect the data to be transmitted, by

exchange of data with the microcomputer **12** and the digital personal organiser **18**, via the local network **10**.

[0092] The interface **30** of the mobile telephone **8** then transmits these collected and assembled data to the server **2** via the external network **4**.

[0093] Upon reception of these data by the interface **29**, the latter sends for example directly to the digital personal organiser **18** a form to be completed by the user, which enables him to classify these data according to certain predetermined criteria in the database **7**.

[0094] The user completes this form by means of his digital personal organiser **18** and sends it back to the server **2**.

[0095] Finally, the input/output interface **29** stores the data transmitted by the mobile telephone **8** in the database **7** according to the classification prescribed by the completed form.

[0096] Therefore it is clear that the data management system according to the invention makes it possible to improve the exchanges of data for a data transmission network such as a local network **10** of terminals forming a pico-net **20** by analysing these data and determining the terminal or terminals most appropriate for processing these data, as a function of the processing capacity of each of them.

[0097] It also makes it possible simultaneously to effect the transmission of data originating from a multiplicity of terminals of the local network **10** to the server **2** by means of one single terminal among the terminals of the local network **10**.

[0098] Finally, it will be noted that the invention is not limited to the embodiment described.

[0099] Thus, as a variant, the server **2** is integrated into the mobile terminal **8** when this latter has sufficient processing capacity to include such a server.

1. Data management system for a local data transmission network (**10**) comprising terminals (**8, 12, 14, 16, 18**) having different data processing capacities, characterised in that at the level of the local network (**10**) it comprises first means (**38**) for determination of the composition of the local network (**10**) in terms of terminals and the data processing capacity of the terminals, connected by an external network (**4**) to:

means (**24**) for analysis of the data to be transmitted destined for the said local network (**10**);

second means (**26**) for determination of the most appropriate terminal or terminals for the processing of these data as a function of the data processing capacity of each of them, determined by the first means (**38**) for determination and data delivered by the means (**24**) for analysis of the data to be transmitted; and

means (**28**) for routing of these data enabling them to be transmitted directly to the most appropriate terminal or terminals as determined previously.

2. Data management system as claimed in claim 1, characterised in that the transmitted data destined for the local network (**10**) comprise several data portions of specific sizes and formats for each of them, and that the second

means for determination (26) are means for determination, for each of these data portions, of the most appropriate terminal (8, 12, 14, 16, 18) for the processing of this data portion as a function of the data processing capacity of each of the terminals, the said routing means (28) being adapted to transmit each data portion directly to the most appropriate terminal as determined previously.

3. Data management system as claimed in claim 1, characterised in that the means (26) for analysis of the transmitted data destined for the local network (10) are means for analysis of formats and of sizes associated with these data.

4. Data management system as claimed in any one of claims 1 to 3, characterised in that the terminals (8, 12, 14, 16, 18) are of different kinds.

5. Data management system as claimed in any one of claims 1 to 4, characterised in that the local data transmission network (10) comprises a predetermined main terminal (8) connected to the said external data transmission network (4).

6. Data management system as claimed in claim 5, characterised in that it comprises means (30) for transmission of data originating from some of the terminals of the local network (10) to storage means (7) which are accessible by the external network (4).

7. Data management system as claimed in claim 5 or 6, characterised in that the first means for determination (38) are associated with means (32) for automatic constitution of the local network (10) comprising:

  means (34) for detection of terminals (12, 14, 16, 18) within a predetermined vicinity of the main terminal (8); and

  means (36) for connection of these terminals and of the main terminal to one another.

8. Data management system as claimed in claim 7, characterised in that the means (32) for automatic constitution of the local network (10) comprise means for activation

of the first means for determination (34), from the time of the appearance of a change in the composition of this local network.

9. Data management system as claimed in any one of claims 5 to 8, characterised in that the main terminal (8) is a mobile terminal.

10. Data management system as claimed in any one of claims 7 to 9, characterised in that the main terminal (8) comprises means (32) for automatic constitution of the local network (10) and means for transmission of the composition of the local network (10) in terms of terminals to the second means (26) for determination of the most appropriate terminal or terminals.

11. Data management system as claimed in any one of claims 5 to 10, characterised in that it further comprises a server (2), connected to the external network (4), comprising means for analysis (24), the second means (26) for determination of the most appropriate terminal or terminals, the means for routing (28) and means (22) for data searching on the Web (6) as a function of a request transmitted by the main terminal (8).

12. Server for a data management system as claimed in claim 11, characterised in that it is connected to the external network (4), comprising means for analysis (24), the second means (26) for determination of the most appropriate terminal or terminals, the means for routing (28) and means (22) for data searching on the Web (6) as a function of a request transmitted by the main terminal (8).

13. Main terminal for a data management system as claimed in any one of claims 5 to 11, characterised in that it is connected to the external data transmission network (4) and that it comprises means (32) for automatic constitution of the local network (10) and means for transmission of the composition of the local network (10) in terms of terminals to the second means (26) for determination of the most appropriate terminal or terminals.

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